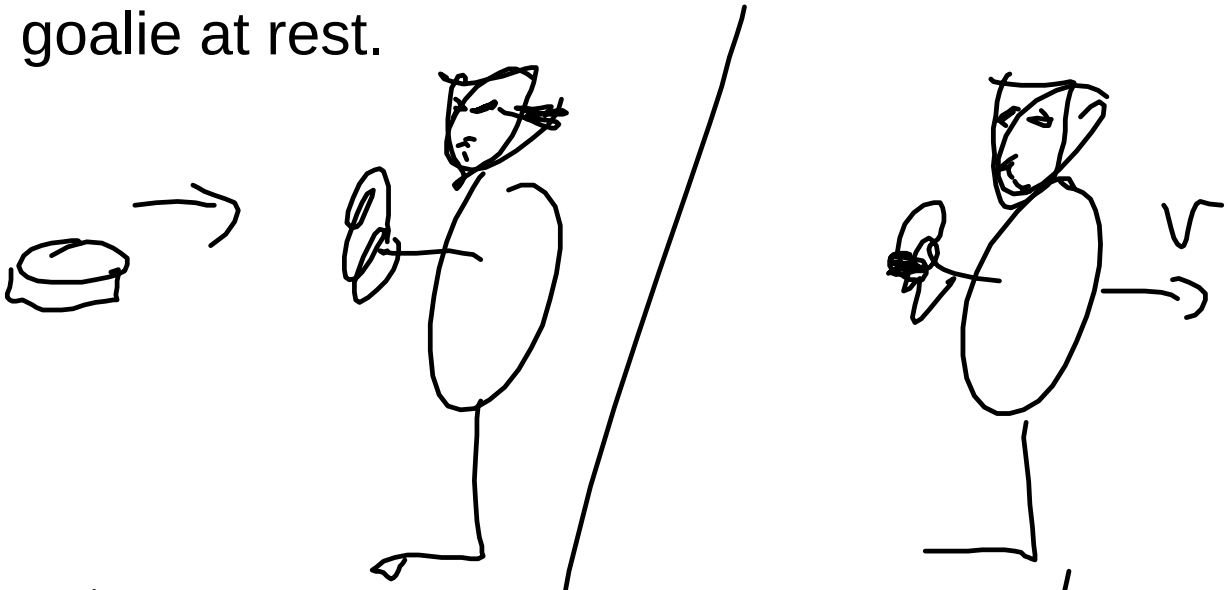
Homework?

Q5
a 0.105 kg puck moving at 48m/s is caught by a 75kg goalie at rest.



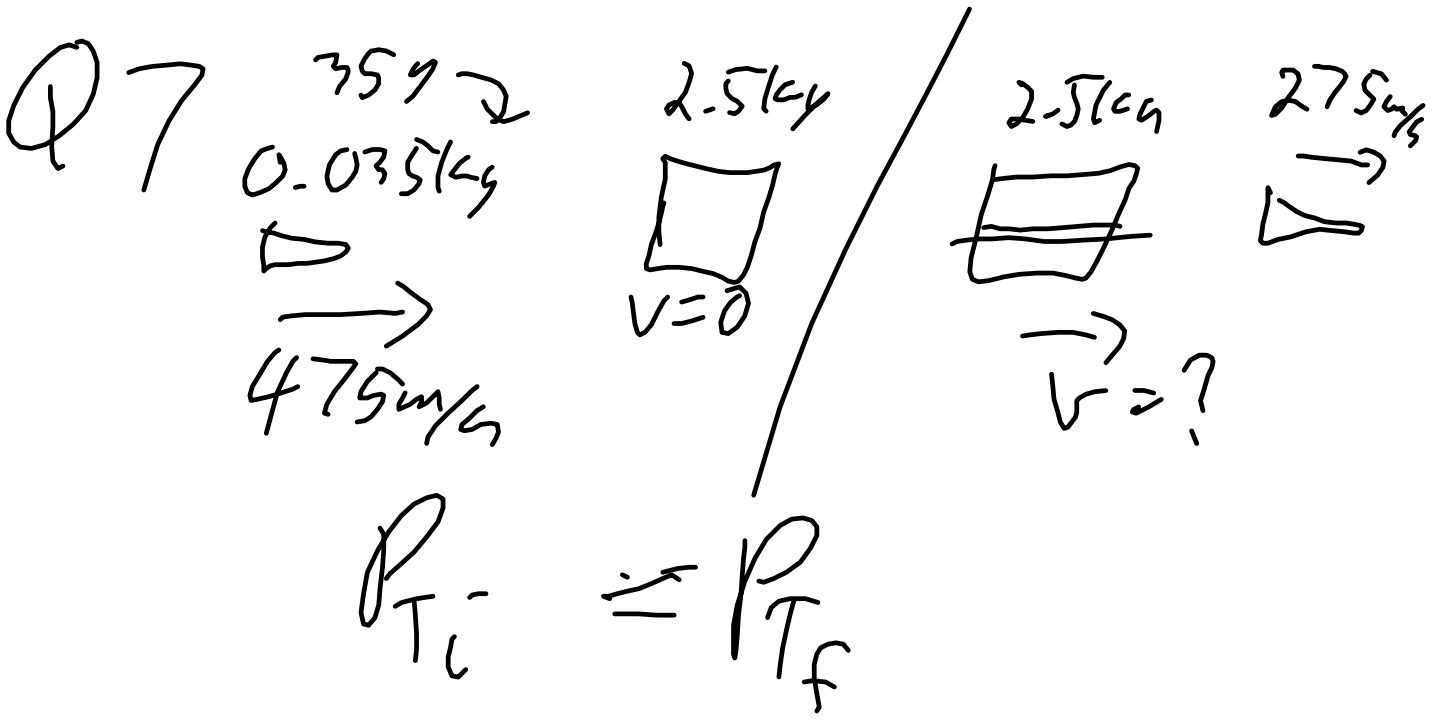
Momentum is conserved $\sum p_i = \sum p_f$

$$m_p v_p + m_g v_g = (m_p + m_g) v$$

$$(0.105)(48) + 75(0) = (0.105 + 75)\, v$$

$$v = 0.067 \text{ m/s}$$

Q7



$$p_{T_i} = p_{T_f}$$

$$m_b v_{bi} + m_w v_{wi} = m_w v_{wf} + m_b v_{bf}$$

$$0.035(475) + 2.5(0) = 2.5 v_{wf} + 0.035(275)$$

0.035x475=16.625
0.035x275=9.625

16.625-9.625=7 = $2.5V_{wf}$
7/2.5=2.8m/s = v_{wf}

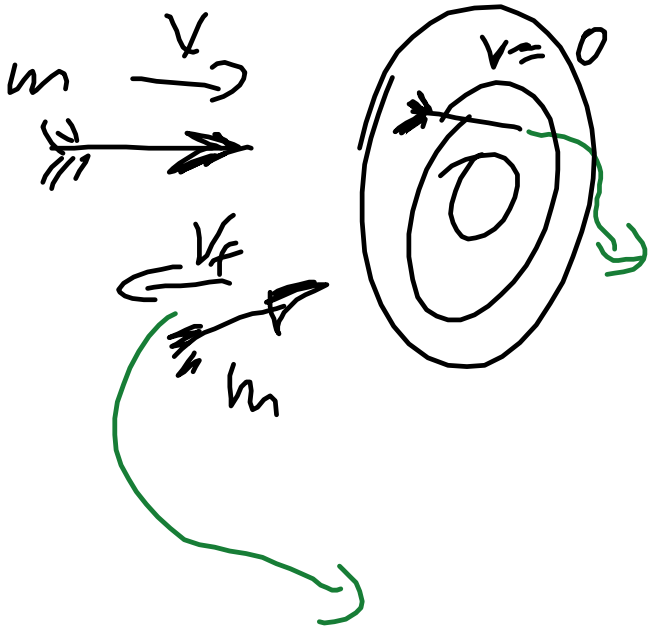
p188 Q9-12 p191 CR 2.1-2.3
(skip 2-d problems - physics 12)
p192 RC 1, 2, 7, 9, 10

P180

CR 1.1- momentum is a vector so they are different
CR1.2 - if the force acts over a longer time (bend your knees) less force is required for the same change in momentum, impulse.
- it hurts less

CR1.3 The raindrop has velocity and p=mv while the tanker has v=0 so p=0 even though m is big, lots of inertia.
It depends on the frame of reference.

CR 1.4



$\Delta p = p_f - p_i$

$= 0 - mv$

$= -mv$

Bounces Back $\Delta p = \theta m v_f - mv$

Backwards

$= -(mv_f + mv)$

Bigger magnitude

Block 2-4

eg. A 0.450kg baseball is moving at 100 miles/hour

100 miles/hour(1.6km/mile)(1000m/km)(h/3600s) = 100x(1.60934)x1000/3600=44.70389

44.7 m/s

you hit it with a bat and goes back at -50.0m/s if the ball is in contact with the bat for 0.0200s

a) what is the momentum of the ball before and after contact?

p=mv = 0.45x44.7=20.1kgm/s

pf= 0.45x-50=-22.5 kgm/s

b) what is the impulse on the ball? on the bat?

impulse= Δp = pf-pi =-22.5-20.1=-42.6 kgm/s on the ball

on the bat is equal and opposite = 42.6 kgm/s

c) what is the force on the ball? on the bat?

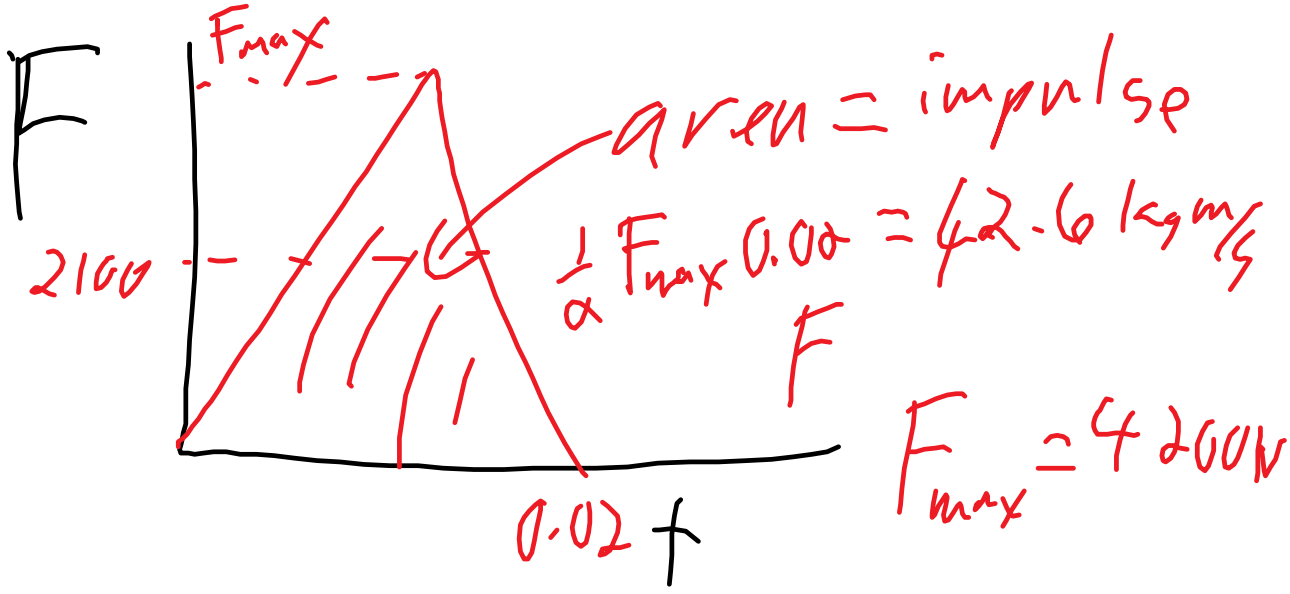
F= ma = m Δv/Δt = Δp/Δt

F = -42.6/0.0200=-2130N on the ball

on the bat, F = +2130N

a) keeners: impulse = area under a F-t graph. sketch the F-t graph if the force increases and decreases linearly

decreases linearly



Homework
p185 Q7

kg, m, s → N, J

35g = 0.035kg

475 m/s

2.5kg

2.5kg

275 m/s

0.035kg

Before

After

$$p_{ti} = p_{tf}$$

$$m_B v_{Bi} + m_w v_{wi} = m_w v_{wf} + m_B v_{Bf}$$

$$0.035(475) + 2.5(0) = 2.5 v_{wf} + 0.035(275)$$

0.035x475=16.625
0.035x275=9.625

16.625 = 2.5v + 9.625
2.5v = 16.625-9.625=7
v= 7/2.5=2.8 m/s

p188 Q9-12 CR 2.1-2.3 (don't do 2d collisions - physics 12)
p192 RC 1,2,7,9,10
Quiz Wednesday Dec 13th
Test Dec 19th
Lab next class Dec 11th

p180
Q1 different because momentum is a vector - same magnitude but different direction.

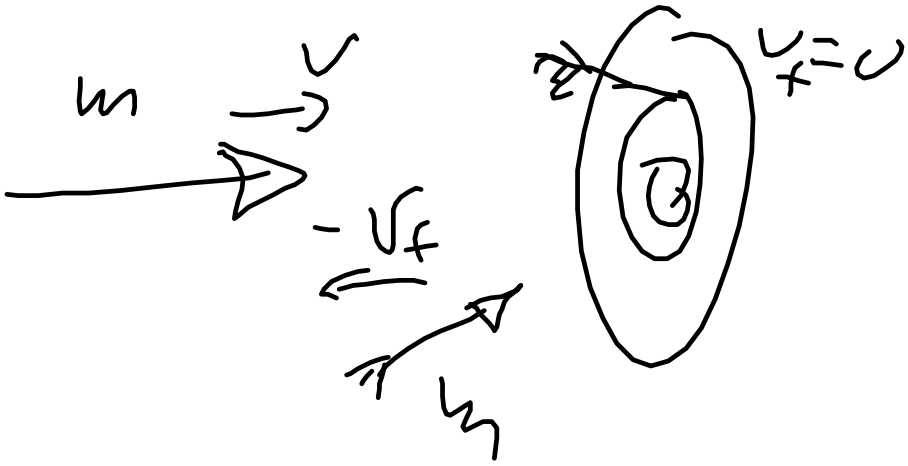
Q2 Impulse = change in momentum=F x t

for the same change in momentum, if the force acts over a longer time, the force will be less.
10 kgm/s = F x 5 s, F=2N
10kgm/s = F x 1s, F= 10N

Q3
the raindrop has more momentum because it has both mass and velocity while the tanker has only mass if it is at rest.
(depends on the frame of reference)

(depends on the frame of reference)

Q4



$$\text{impulse} = \Delta p = p_f - p_i$$

$$\text{stop's} = 0 - mv = -mv$$

$$\text{target} = mv$$

$$\text{Bounces} = -mv_f - mv = -(mv_f + mv)$$

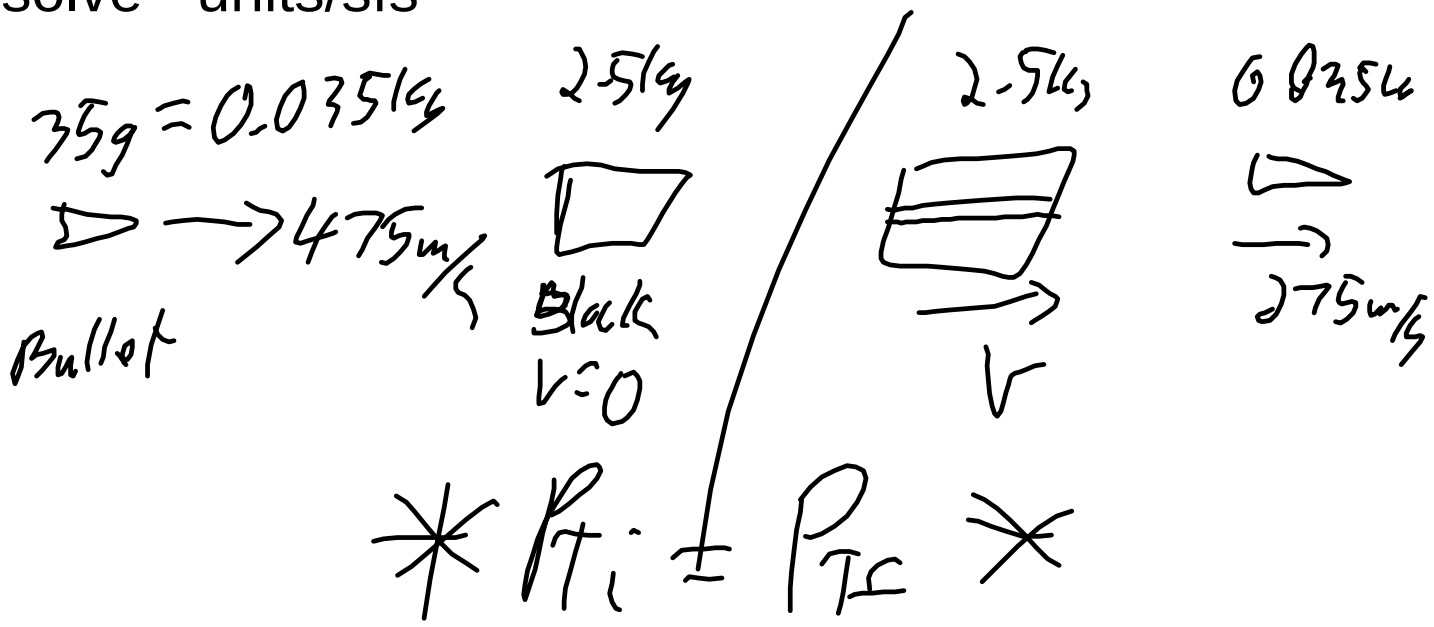
$$\text{target} = mv_f + mv$$

so the impulse on the target is great if the arrow bounces back than if it sticks

Block 2-2
Quiz Wednesday Dec 13
Test Tuesday Dec 19th
Lab next class Dec 11th

p185

Q7
steps: givens - in a diagram
formula - momentum is conserved
solve - units/sfs



$$P_{Ti} = P_{Tf}$$

$$m_B v_{Bi} + m_W v_{Wi} = m_W v_{Wf} + m_B v_{Bf}$$

$$0.035 \times 475 + 2.5(0) = 2.5 v_{wf} + 0.035(275)$$

rest

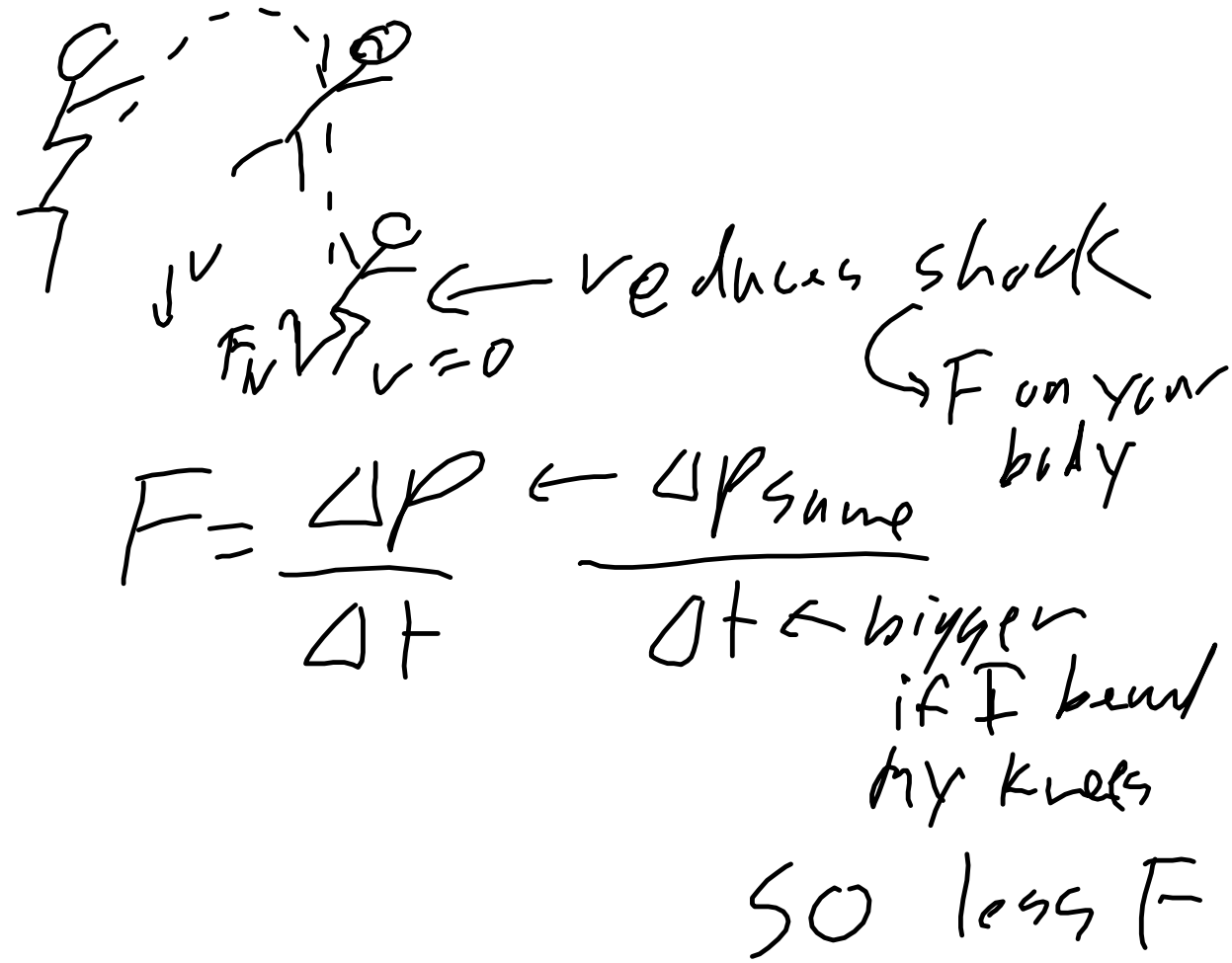
0.035x475=16.625
0.035x275=9.625
16.625-9.625=7
2.5v=7
v= 7/2.5=2.8 m/s

p188 Q9-12 p191 CR 2.1-2.3
(skip 2-d problems - physics 12)
p192 RC 1, 2, 7, 9, 10
15 minutes: p180 CR 1.1-1.4 read your answers

p180

CR1.1 momentum of a car going South and North are the same magnitude but different direction so the momentum is different because it is a **vector** quantity.

CR1.2

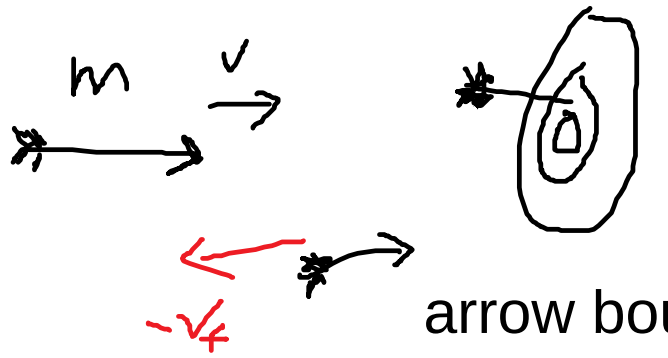


if impulse is 10 and time is 10, F = 1
if impulse is 10 and time is 1, the force is 10

2.3 more momentum Tanker or raindrop?

raindrop because p=mv , v= 0 for tanker so raindrop has more momentum
p=mv = mx0 =0

2.4



arrow sticks

arrow bounces back

bigger impulse?

impulse = pf-pi =
stops pf =0 so impulse = 0-mv = -mv so the impulse on the target = mv

bounces back, pf = -mvf so impulse = -mvf-mv = -(mvf+mv) impulse on the targe is mvf+mv which is bigger than mv